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Mensuration Services Program (MSP)

Release Notes / Version Description Document for

MSP Geographic Translator (GEOTRANS) Version 3.5

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1. SCOPE

1.1 IDENTIFICATION

This document is the Release Notes for Version 3.5 of the MSP Geographic Translator (GEOTRANS).

1.2 SYSTEM OVERVIEW

GEOTRANS is an application that allows you to convert geographic coordinates among a wide variety of coordinate systems, map projections, grids, and datums. GEOTRANS runs in Microsoft Windows, LINUX and UNIX environments.

The user interface of GEOTRANS consists primarily of a single window. To convert coordinates, select the coordinate reference frame and datum in which your coordinates are defined, enter any associated parameters, and enter the coordinates in the upper half of the window. Then select the coordinate reference frame and datum to which you want the coordinates to be converted, and enter any associated parameters, in the lower half of the window. Click on the Convert Upper-to-Lower button, and the resulting coordinates will be displayed in the lower half of the window. You can convert additional coordinate sets from the same source by just entering the new coordinates and clicking on the Convert Upper-to-Lower button. You can change any of the coordinate reference frame, datum, or parameter selections at any time. Also, you can reverse the roles of input and output by using the Convert Lower-to-Upper button. Currently, thirty-five different types of coordinate systems, map projections, grids, and coding schemes are supported, as well as more than two hundred different horizontal datums.

GEOTRANS can also be used to efficiently convert large numbers of coordinates contained in text files. The file format is very simple. A multi-line file header defines the coordinate reference frame and datum of the coordinates contained in the file, including any associated parameter values. Following the header, each line contains a single set of coordinates, separated by commas followed by at least one space. Using the GEOTRANS file processing interface, you can select an existing file of coordinates to be converted. You can then define the coordinate reference frame and datum to which you want to convert the coordinates, along with any associated parameter values. Finally, you can specify the name and location of the output file that is to be created. GEOTRANS then converts all of the coordinates in the input file and creates the output file as a single operation.

1.3 DOCUMENT OVERVIEW

The MSP GEOTRANS 3.5 Release Notes describes what has changed between the MSP GEOTRANS 3.4 release and the 3.5 release. It also describes the installation process.

GEOTRANS software is provided via the WWW, SIPRNet, and JWICS networks. It can also be requested via CD-ROM or DVD media. Users can download the executable software only or the executable software and the source code. Executable software is provided as built for five Operating Systems: Windows XP 32-bit, Windows 7 64-bit, Sun Solaris 10 SPARC 32-bit, Red Hat Enterprise Linux (RHEL) v5 32-bit and 64-bit. It should also work on all later versions of these operating systems.

The GEOTRANS software consists of the Coordinate Conversion Service (CCS) libraries and the GEOTRANS application. The GEOTRANS CCS libraries are written in C++. The Windows version was built using MS Visual Studio 2008 (32-bit) and MS Visual Studio 2010 (64-bit). The Solaris version was built using Sun Studio12 C++ v5.10. The Linux version was built using GCC v4.1.2. The GEOTRANS application Graphical User Interface (GUI) is written in Java and requires the Java Runtime Environment (JRE) version 1.5 or later to execute. We recommend using JRE version 1.7 update 55 or later that addresses all known vulnerability issues in the earlier versions of JRE.

Software Integrators should refer to the Programmer's Guide for information regarding the GEOTRANS software structure, the programming environment in which it was developed, the Application Programming Interface (API) and the process for building and modifying the GEOTRANS software.

Users should refer to the User's Guide for information regarding the capabilities and use of the GEOTRANS GUI for interactive coordinate conversion.

2. REFERENCES

For the list of referenced documents, see the MSP GEOTRANS Programmer's Guide or the User's Guide.

3. RELEASE NOTES DESCRIPTION

3.1 INVENTORY OF MATERIAL

The unclassified MSP GEOTRANS 3.5 release provides executables and libraries built for five operating systems and compiler combinations: Windows XP 32-bit, Windows 7 64-bit, Sun Solaris 10 SPARC 32-bit, Red Hat Enterprise Linux (RHEL) v5 32-bit and 64-bit. MSP GEOTRANS 3.5 is also available for all nine MSP supported platforms in the classified MSP releases. Both dynamic link libraries (.so for Unix and .dll for Windows) and static link libraries (.a for Unix and .lib for Windows) are provided in this release.

The GEOTRANS software was designed to reduce as much as possible any operating system dependencies and therefore should work on all later versions of these operating systems (e.g., Windows 7, Solaris 10, RHEL v5). If not, the source code is provided for rebuilding on the user's platform or choice. For information regarding the GEOTRANS software structure and building the software from the source code, refer to the Programmer's Guide.

3.2 SYSTEM REQUIREMENTS

The hardware requirements of the GEOTRANS software are minimal. It is designed to run on any 32-bit or 64-bit processor with 512MB or more of memory and 300MB or more of available disk space.

GEOTRANS software operates on Solaris, Windows, and Red Hat Linux operating systems.

Platform	OS and Version	Compiler and Version
Sun	Solaris 10 SPARC 32-bit multi-thread	Sun Studio 12 C++ 5.10
PC	Red Hat Enterprise Linux 5 32-bit multi-thread	GCC 4.1.2
PC	Red Hat Enterprise Linux 5 64-bit multi-thread	GCC 4.1.2
PC	Windows XP SP2 32-bit multi-thread	Visual Studio 2008
PC	Windows 7 64-bit multi-thread	Visual Studio 2010

Supported Operating Systems and Compilers

3.3 ADDITIONAL SOFTWARE REQUIRED

3.3.1 JAVA RUNTIME ENVIRONMENT

The GEOTRANS application GUI is written in Java and requires the JRE to execute. JRE version 1.7.0.55 resolves all known vulnerabilities and was used for testing MSP GEOTRANS 3.5. It is recommended that the GEOTRANS users also use 1.7.0.55 or later. JRE 1.7.0.55 or the latest JRE can be downloaded from the Oracle website:

http://www.oracle.com/technetwork/indexes/downloads/index.html.

3.3.2 VISUAL STUDIO REDISTRIBUTABLE PACKAGE

The GEOTRANS Windows libraries are compiled using Microsoft Visual Studio C++ compilers and they required the runtime components of Visual C++ libraries to run. If the system does not have the required runtime components of Visual C++ libraries, GEOTRANS users will need to install the Microsoft Visual C++ Redistributable Package.

Microsoft Visual C++ Redistributable Package can be downloaded from the following websites:

For Windows XP 32-bit GEOTRANS download the Microsoft Visual C++ 2008 Service Pack 1 Redistributable Package:

http://www.microsoft.com/en-us/download/details.aspx?id=11895

For Windows 7 64-bit GEOTRANS download the Microsoft Visual C++ 2010 Service Pack 1 Redistributable Package:

http://www.microsoft.com/en-us/download/details.aspx?id=13523

GeoTrans 3.5 includes the Visual Studio redistributable DLLs with the installation package so that users do not have to download the Redistributable Package from the web site.

3.4 SUMMARY OF SOFTWARE CHANGES

MSP GEOTRANS 3.5 is the sixth release of the re-architected GEOTRANS application under the MSP program. This release repairs several issues discovered in operations. There is no change to the look and feel of the GUI, therefore user transition from GEOTRANS 3.4 to 3.5 should be seamless. There is no change to the API, therefore integrators should easily upgrade from GEOTRANS 3.4 to 3.5 libraries.

NOTE: In GEOTRANS 3.2, 3.3, 3.4 and 3.5 an iterative algorithm is used in the Geocentric to Geodetic conversion to achieve better accuracy. If a user needs to revert back to the legacy non-

iterative GEOTRANS algorithm, then an environment variable MSPCCS_USE_LEGACY_GEOTRANS needs to be defined before starting GEOTRANS.

The following tables describe the resolved Discrepancy Reports (DRs) and Enhancement Requests (ERs) included in the MSP GEOTRANS 3.5 release (Table 1), the Open Discrepancy Reports remaining in the MSP GEOTRANS 3.5 release (Table 2) for implementation in a future release and the Open Enhancement Requests (Table 3) for consideration in a future release.

Table 1. MSP GEOTRANS 3.5 Resolved DRs and ERs

ID	Title	Pri	Impact	Resolution/Workaround
23923	Ellipsoid Table Full Message	9	The state of Wisconsin has developed a new ellipsoid for each county by increasing the semi-major and –minor axes of the GRS 80 ellipsoid resulting in 59 new ellipsoids (some counties are combined). When the customer adding new ellipsoids in GEOTRANS he received the following error "ellipse table full".	Remove the limits on the number of ellipsoids and datums that can be created.
29127	MSP Geotrans Transverse Mercator improvement	9	The TM conversion used in GeoTrans is approximate and is known to have distortion as you move away from the central meridian. GeoTrans currently puts up a warning message in this case. Craig Rollins (NGA) proposed using an updated transformation that more accurate and is valid over a much greater range. NGA can supply the algorithms, sample code (FORTRAN or C) and test data.With this change, the deviation from the central meridian allowed before a warning is issued could be greatly expanded. Also, UTM allows zone overide for adjacent zones. UTM could allow zone override for a larger range of zones.Regression results would be affected for all coordinate systems based on Transverse Mercator.	Changed Transverse Mercator to use the new algorithm.
29938	Enhance the Definition of _USRDLL in DtccApi.h	9	The current definition does not allow third-party GeoTrans developers to build both dynamic and static libraries easily. The proposed fix is to add an additional preprocessor definition to support the building of static libraries.	Add dll import pre-processor to header files

ID	Title	Pri	Impact	Resolution/Workaround
29982	Add Visual Studio Redistributable Files to GeoTrans	9	Windows version of GeoTrans is currently set up to be run from the local or C: drive. If user's want to run GeoTrans from a network drive they need to copy the Visual Studio redistributable files from their local drive to a folder within GeoTrans after they install to the network drive or they need Visual Studio installed on their computer; otherwise GeoTrans will not run. CSAT has requested that the Visual Studio Redistributable files (from Microsoft) be added to the GeoTrans software so users will not need to move the files. These files would need to be added to both the installer version and the zipped version of GeoTrans for windows.	Copy the Visual Studio redistributable DLLs to the devkits.
30014	MGRS Reported Precision	4	Conversion from Geodetic to MGRS occurs with the requested precision but always reports a precision of 5 (Precision:tenthOfSecond). The bug is found in MGRS.cpp in 2 methods MSRS::fromUTM() and MGRS::fromUPS() where the result is returned by calling the two-argument constructor for MGRSorUSNGCoordinates which used the default precision of Precision:tenthOfSecond. A three-argument constructor with the third argument being the precision should be called instead.	Modified the MGRS coordinates created to hold the precision of the coordinate.
30077	Add Web Mercator to GeoTrans	9	Web Mercator was requested as a new coordinate system to GeoTrans. It was requested that only the conversion from Web Mercator to Geodetic be supported and not to any other coordinate system or from any coordinate system to Web Mercator.	Added Web Mercator
30156	Static library naming is not consistent in the GeoTrans Windows build	4	In the Windows project file included with the GeoTrans distribution, the static library name is currently msp_ccs.lib. It should be renamed to MSPdtcc.lib to be consistent with the dynamic library MSPdtcc.dll. This problem does not affect GeoTrans users. It only affects the developers when they try to build the sample code.	In Visual Studio solution rename the static library to MSPdtcc.lib instead of msp_ccs.lib.

ID	Title	Pri	Impact	Resolution/Workaround
30170	Walking seen in MGRS testing	4	MGRS may go to wrong cell due to rounding. This issue was discussed during MSP 1.4 SVT and the decision was made not to go to the center of MGRS cell at this time. This DR is to avoid numerical rounding at the border of MGRS cell. This might not cover all cases that walking can occur but it does handle the UTM to MGRS problem from Trouble Call G-594.	Added 4.99e-4 meter pad to incoming UTM coordinates to avoid rounding problems. The pas is also used when determining the zone to use. Modified checks for longitude. One adds epsilon to –Pi and 2Pi check for MGRS and UTM, the other makes sure longitude delta is in –Pi to Pi range.

Table 2. MSP GEOTRANS 3.5 Open DRs

ID	Title	Pri	Impact	Resolution/Workaround
25204	GEOTRANS vs MSP – Quit vs Exit on closing windows	4	None. A different convention is used on the GEOTRANS GUI and MSP GUI to close the application ("Quit" vs "Exit"). Consistency would be nice.	The resolution is to change GEOTRANS to use "Quit" on the File dropdown menu.
27158	GEOTRANS in the Java, Look and Feel mode, Enter does not remove the "Help, About" GUI	4	Minor. User cannot close the "Help About" GUI using the Enter key from the keyboard when Java Look and Feel mode selected.	The workaround is to select the OK button to remove the window. The resolution is to allow Enter to close the window when in the Java Look and Feel mode, as is the case for the Solaris and Windows Look and Feel modes.
29600	GEOTRANS does not accept latitude of origin at 90 degrees	4	The Belgium Lambert 1972 projection specifies a latitude of origin of 90 degrees. MSP does not allow latitudes of origin above 89:59:59.	None.
29645	Update GEOTRANS Lat/Lon Error Message	4	None. When user enters an improperly formatted latitude or longitude, an "out of range" message is displayed, which does not indicate improper format.	None
29966	GeoTrans Error Message Should be Enhanced	4	When the New Zealand Map Grid is either the "To" or the "From" coordinate system and the datum is NOT set to "GEO: Geodetic Datum 1949, NZ", the buttons turn red. If the user attempts to make a conversion the error message states "Ellipsoid must be International" (something similar to those words). However there are many datums that use the International Ellipsoid including all EUR datums, so this error message should be enhanced.	Geotrans should either set the datum automatically to GEO or the error message should state "Datum must be GEO".

ID	Title	Pri	Impact	Resolution/Workaround
29974	GeoTrans Setting of Data Directory has Problems	4	GeoTrans relies on the setting of an environmental variable to set the data directory. A user reports a problem and a related desired enhancement. The problem is with copying to memory that has not been allocated when the MSPCCS_DATA environmental variable is not present. The related enhancement is to centralize and simplify the setting of the data directory and to offer an alternative to setting an environmental variable.	The work around is to make sure environment variable MSPCCS_DATA is set properly
30125	Transverse Mercator converter deviates slightly from book	4	A new NGA standard describes the Transverse Mercator conversion to/from geodetic. In this doc NGA SIG-19, specific values are given for series expansion coefficients for each ellipsoid in GeoTrans. Instead of using these, the current implementation computes these coefficients from the input eccentricity. This is slightly slower. This DR is to revert to the book values. The difference in results is expected to be very minor.	This requires a change of interface to provide the ellipsoid name or code in the interface. It is because of this API change that this work is separated into a separate ER. Note that for user defined ellipsoids, we will still need the ability to generate the coefficients.

Table 3. MSP GEOTRANS 3.5 Open ERs

ID	Title	Pri	Impact	Resolution/Workaround
23924	User save of parameters for projections/grids	9	Providing the option for users to save input parameters for projections and grids, with a specified name, could save a user time and minimize input errors.	The resolution is to add 'radio button' on the parameter input window allowing user saves of parameters with a field to enter a name for the projection/grid. This has probably been the number one user request.
23926	Gauss-Kruger projection	9	Many users do not realize that the Gauss-Kruger projection is a member of the transverse Mercator family. Listing the Gauss-Kruger as a projection type would streamline the workflow of users.	The resolution is to list the Gauss-Kruger as a projection type.
25411	GEOTRANS GUI File -> Load Setting returns an error	9	Users of GEOTRANS installed as a shared application on a network cannot Save and Load personal settings.	The resolution is to provide the capability to save and restore settings to/from a User's Home directory, instead of to/from the installed directory.
26200	MSP should allow for third party coordinate conversions	9	Users are limited to the coordinate conversions provided by GEOTRANS.	The resolution is to design the capability for a “plug-in” coordinate conversion.
26551	Add UTM units option of US Survey Feet	9	Surveyors in the US who use units of US Survey Feet with UTM coordinates cannot use GEOTRANS to/from UTM coordinates.	The resolution is to add the US Survey Feet as a selectable unit for UTM Easting and Northing values.
26987	MSP GEOTRANS should add new transformation model	9	GEOTRANS users cannot use the seven parameter model described in NATO STANAG 2211.	The resolution is to add the transformation to the CCS and to the GEOTRANS GUI as described in NATO STANAG 2211.
27339	Add an “administrative rules” button to the UTM coordinate option	9	Related to DR 27181: Users cannot convert to True UTM coordinates in the special regions over Southern Norway and Svalgard, without specifying a zone override.	The resolution is to add an “Administrative Rules” button to the GEOTRANS GUI to control whether True UTM coordinates are returned or the special rules for UTM zones are returned.
27813	GeoTrans User Defined Spherical Radius	9	Modify GeoTrans to allow a user entered radius for all spherical models of the earth.	The resolution is to modify GeoTrans to allow a user entered radius for all spherical models of the earth.

ID	Title	Pri	Impact	Resolution/Workaround
27814	Coordinate Conversion Service report Point Scale factor and Convergence of Meridian	9	Coordinate Conversion Service to report Point Scale and Convergence of Meridians for conformal mappings.	Modify Coordinate Conversion Service to report Point Scale and Convergence of Meridians for conformal mappings. This is a change to the CCS API. It is not needed for the GeoTrans GUI.
28084	Z Pass Through option for batch coordinate conversions	9	A user in the bathy group at NGA uses GeoTrans to convert between Degrees Minutes Seconds and Decimal Degrees and would like the Z value to be a pass through. In addition, UTM's to geographics (DD or DMS) with a "z pass through" is needed for for hydrographic work. Hydrographic survey work, commercial or DOD (Naval Oceanographic Office and Army Corps of Engineers) is routinely in UTMs, normally WGS84, but frequently in State Plane; in the case of data received from other international partner, it may be in a local, national datum as well.	No workaround.
29536	Allow users to save their own settings	9	Configuration settings are saved in setting.xml in the MSPCCS_DATA directory and the changes are common for all users. This forces users to copy the data files into their home directory structure to save settings. It would be nice to have a separate environment variable for the settings directory in order to give users the option to save the settings as well as custom datums in their own directory.	The workaround is to have different installation for each user.
29573	Add setting methods to class UPSCoordinates class	9	A user reports that currently UPSCoordinates class only provides a single method to set hemisphere, easting and nothing all at the same time. It is an inconvenience not to be able to set the values individually. Recommend adding the following methods: setHemisphere, setEasting, setNorthing to UPSCoordinates class.	The resolution is to add setting methods as recommended.

ID	Title	Pri	Impact	Resolution/Workaround
29739	Enhance Constant definitions for GeoTrans	9	Constants such as PI and PI/2 are defined multiple times in the GeoTrans code. Sometimes they are defined using #define and other times they are global C++ constant double.	The resolution is to define global constants in one place.
30083	Enhance GeoTrans to support third party geoids	9	Some geotrans users have geoids that define mean sea level for their area of interest and they would like to be able to use these geoids with geotrans without have to do external calculations.	This enhancement is to allow a user to drop a geoid into geotrans and have it available for use on the ellipsoid drop-down menu.
30139	Enhance GeoTrans to support RAE coordinates	9	Enhance GeoTrans to support Range/Azimuth/Elevation (RAE) coordinates.	This enhancement is to provide support to convert from Range/Azimuth/Elevation coordinates to other coordinates and vice versa.
30163	Enhance GeoTrans to support converting elevations in units of FEET	9	User requests to enhance current GeoTrans to provide 2 functionalities that were in GeoTrans 2.4.1k Default datum is set to EGM84-10D-BL Allow for elevations in FEET	This enhancement is to provide functionalities that were in GeoTrans 2.4.1k.
30173	GeoTrans uncertainty does not reflect conversions through coarse precisions	9	When coordinates are converted to a coarse precision their uncertainties are not properly increased.	No workaround.

ID	Title	Pri	Impact	Resolution/Workaround
30211	Two problems with MGRS/UTM in GeoTrans	4	The first problem is with the setting of the latitude band in MGRS. The border used is PI_OVER_180/divisor. The divisor should be set as divisor – 1.0e5 / computeScale(precision). However, it is currently set as divisor – computeScale(precision). Note that the band does not affect the MGRS to geodetic transform, so the ground coordinate is not affected. The second problem is for negative longitude in UTM. The longitude is moved to a positive value by adding 2*PI + 1.0e-10. It is the extra factor of 1.0e-10 that should not be there. This factor has been in GeoTrans since before it was part of MSP, so it is hard to know its purpose. The new Transverse Mercator (GeoTrans 3.5) algorithm moves the Easting about 0.0006 meters due to this extra factor. This is less than the minimum precision of 1.0e-3 of GeoTrans.	No workaround.

3.5. INSTALLATION INSTRUCTIONS

The unclassified MSP GEOTRANS 3.5 release can be downloaded from the WWW, SIPRNet or JWICS networks—or can be delivered via CD-ROM or DVD media by request. The unclassified MSP GEOTRANS 3.5 release is provided in zip format for Windows platforms and tgz format for Unix platforms and does not require a registration key or a license key to install and run. The MSP GEOTRANS web page addresses are as follows:

WWW – http://earth-info.nga.mil/GandG/geotrans/

SIPRNet – http://www.geoint.nga.smil.mil/products/gandg/geotrans

JWICS – http://www.geoint.nga.ic.gov/products/gandg/geotrans/

The GEOTRANS 3.5 application requires the JRE to operate. JRE version 1.7.0 update 55 or later is recommended. The startup script may need to be modified to set the correct version of the JRE.

The startup script for Solaris systems is found in:

<install dir>/geotrans3.5/GEOTRANS3/solaris/runGeotrans.csh,

For Linux systems, it is found in:

<install dir>/geotrans3.5/GEOTRANS3/linux/runGeotrans.csh

For Windows systems, it is found in:

<install dir>\geotrans3.5\GEOTRANS3\win\runGeotrans.bat.

For Unix systems, using an editor of your choice, open the runGeotrans.csh start up script and modify the following line so that the parameter JAVA_HOME is set to Java's home directory. For example :

setenv JAVA_HOME /usr/jdk1.7.0_55

For Windows systems, using an editor of your choice, open the runGeotrans.bat startup script and modify the following line so that the path to the JRE is set correctly. For example change:

@java –Xss1024k –jar MSPCCS.jar

to

@"C:\Program Files\java\jre1.7.0_55\bin\java.exe" –Xss1024k –jar MSPCCS.jar

GEOTRANS 3.5 for Windows users is also available in self installation InstallAnywhere package. After downloading the installation file from the web-site, double click on install.exe and follow on screen instructions to complete the installation.

GEOTRANS 3.5 InstallAnywhere package supports silent installation. To perform silent installation:

1. Create the properties file installer.properties in C:\Temp directory

```
C:\> install.exe –r c:\Temp
```

2. Specify the installation directory by modifying C:\Temp\installer.properties.

3. Perform silent installation

```
C:\> install.exe –i silent –f C:\Temp\installer.properties
```

3.6 MSP HELP DESK SUPPORT

For help with the installation, to request a delivery on CD-ROM or DVD media, to report an issue, or for general help of any kind, contact the MSP Help Line at 858-592-5677 (5MSP) or MSP_Help@nga.mil.

GEOTRANS Enhancement Requests can also be reported to the MSP Help Line or to the National Geospatial-Intelligence Agency (NGA) Coordinate Systems Analysis Team (CSAT) at (314) 676-9124, DSN 846-9124 or coordsys@nga.mil.

APPENDIX A – ACRONYMS

API	Application Programming Interface
CCS	Coordinate Conversion Service
CD-ROM	Compact Disk – Read Only Memory
CSAT	Coordinate Systems Analysis Team
DR	Discrepancy Report
DVD	Digital Versatile/Video Disk
EGM	Earth Gravity Model
ER	Enhancement Request
GCC	Gnu Compiler Collection
GEOTRANS	Geographic Translator
GUI	Graphical User Interface
JRE	Java Runtime Environment
MB	MegaByte
MS	Microsoft
MSL	Mean Sea Level
MSP	Mensuration Services Program
NGA	National Geospatial-Intelligence Agency
RHEL	Red Hat Enterprise Linux
WWW	World Wide Web